Mathematics 2002
Performance Definitions

Grade 8

Basic Level

Students who scored at the "Basic" level demonstrated minimal evidence of their understanding of the grade-level appropriate mathematics content in the Michigan Curriculum Framework. Such evidence was exhibited by, but was not limited to, students:

Applying basic concepts, algorithms, properties, and procedures to solve simple, one-step problems presented in a real-world context.

- Some understanding of integers and rational numbers (not complete)
- Students can read, interpret and apply one-step problems
- Knows 2-dimensional shapes and their important attributes
- Solve 1 – step proportional problems and recognize symmetry, but have limited conceptual understanding
- Limited understanding of fractions, percents, ratios, decimals
- Appropriate use of basic properties/attributes using fractions, etc.
- Reads, interprets, applies appropriate strategies to solve one-step problems
- Know some important attributes of 2 and 3 dimensional objects
- Has reasonable sense of equivalence
- Can use a given formula

Using appropriate tools (such as tables, charts, graphs, compasses, protractors, and/or formulas) to obtain mathematical information.

- Display data
- Collect data-limited population
- Use tools to recognize and interpret information
- Answer simple questions
- Difficulty in interpreting calculator display window
- Can perform one-step measurement
- Use tools to measure with minor errors
- Find information using tools, table, and chart
- Create bar and line graphs
- Technology: knowledge of scientific calculator functions (basic operation addition, subtraction, multiplication, division, fractions, percents, decimals, integers)

Generating minimal written responses to questions.

Makes a response – tries to complete

Like broad bullets but cannot be used for setting cut points – no evidence

- (Operations) commutation mastered with whole numbers
- Basic understanding of the number (order, position, number system)
- Problem solving: some sense of how to begin but can't continue (identify but can't solve)
- Formulas: given formula, manipulate numbers to find solution
- Minimal math vocabulary
- Reasoning shows gaps
- Skips portions of written response; incomplete ideas or incorrect concepts expressed

Recognizing examples and applications of mathematical ideas.

- Limited ability to judge the appropriateness of answers to problems
- Recognize equivalence of benchmark fractions, decimals and percents
- Problem solving: some basic one-step problems with fractions, decimals, percents
- Recognize/identify patterns
- Difficulty in visualizing representations
- Difficulty making mathematics connections
- Difficulty with multi-step but can follow one-step
- Recognizes routine examples
- Identify important variables, identify/recognize algebraic expressions

Met Level

Students who scored at the "Met" level consistently applied grade-level appropriate, integrated procedural knowledge and conceptual understanding to solve problems consistent with the mathematics content in the Michigan Curriculum Framework. Such evidence was exhibited by, but was not limited to, students:

Applying basic concepts, algorithms, properties, and procedures to solve multi-step, routine problems.

- Basic computation integers/rational #
- Read, interpret and apply routine multi-step problems
- Compare/contrast properties of shapes
- Recognize and apply proportional reasoning to multi-step problems
- Can perform multi-step measurement with structure
- Interpret data, organize and create graphs and tables
- Technology: knowledge of scientific calculator functions (basic operations, some independence)
- Some introduction to graphing calculators uses (data, graphs)

Using appropriate tools (such as tables, charts, graphs, compasses, protractors, and/or formulas) to obtain and interpret mathematical information.

- Interpret and apply graph/charts
- Analyze and display data
- Perform special tasks with accuracy and understanding on calculators
- Collect data – random population
- Proficient use of tools
- Construct tables, charts, graphs, gives basic explanation
- Use/interpret calculator
- Generates one-step examples/representations
- Solve multi-step routine problems
- Translate verbally
- Express simple algebraic expressions using symbols
- Accurate measurements using rulers (in and centimeters), protractors, compass

Generating adequate written explanations that show solutions with supporting information.

- Answers what was asked, can draw some conclusions
- Minor misunderstanding
- Possible minor calculation errors
- Makes mathematical connections
- Can give examples and analyze
- Can write one-step and follow multi-step
- Understand math vocabulary
- Can make complete/informal arguments
- Begin using data to substantiate reasoning
- Computations mastered with fractions, decimals, percents with one-step (equivalence implied) problems
- One-step ration/proportion applications
- Problem solving: identify and solve one-step using a strategy with possible minor errors
- Geometry: identify relationships between two dimensional shapes using attributes
- Formula: given list choose correct formula and manipulate to solve one-step problem (backwards, too)

Generating examples and counterexamples of mathematical ideas.

- Evaluate appropriateness of answer to routine problems
- Recognize equivalent representations of more complicated decimal, fractions, and percents
- Understand/basic properties/attributes plus LCM, GCF scientific notation
- Can solve two-step routine problems
- Apply/extend
- Visualize geometric representation and manipulate visualization through written test

Exceeds Level

Students who scored at the "Exceeds" level demonstrated the grade-level appropriate ability to apply integrated procedural knowledge and conceptual understanding to complex and non-routine real-world problems that reflect the mathematical content in the Michigan Curriculum Framework. Such evidence was exhibited by, but was not limited to, students:

Applying concepts, algorithms, properties, and procedures to solve multi-step, non-routine problems.

- Applies/integrates integer/rational numbers
- Read, interpret and apply non-routine multi-step problems
- Reason/apply properties of shapes
- Extend and apply complex proportional reasoning to multi-step problems
- Excellent vocabulary skills
- Extend and analyze multi-step measurement problems
- Apply and extend graphs/charts (Inference)
- Apply data and interpretation of data to complex situations
- Translate freely among representations of decimals, fractions, percents
- Generalize from basic properties/attributes
- Knows when to apply/use properties

Using appropriate tools (such as tables, charts, graphs, compasses, protractors, and/or formulas) to obtain, interpret and apply mathematical information to complex situations.

- Applies and interprets information from tables, charts, graphs to complex situations
- Uses tools to enhance thinking (calculator-lists, stats, functions)
- Synthesize information and applies concepts to solve multi-step problems generalize from examples
- Translate complex algebraic expressions from verbal directions
- Analyze/interpret/infer display data
- Initiate calculators functions on own
- Collect and analyze data – random population
- Select and use proper tool to solve problems
- Technology: knowledge of scientific calculator functions (basic, met) to solve problems
- Guide others in use of graphing calculator (data and graphing)

Generating and justifying conclusions by providing accurate, concisely written responses to mathematical questions.

- Justify, concise
- May extend beyond
- Uses vocabulary (math) spontaneously and correctly
- Can make complete logical chain of reasoning
- Use data accurately to substantiate reasoning
- Extends, generates beyond the obvious
- Computations mastered with integers, fractions, decimals, percents, and ratios with multi-step problems
- Problem solving: identify and solve multi-step using an appropriate strategy
- Geometry: visualize and identify basic three dimensional shapes and relationships
- Formula: given formula list choose formula and manipulate to solve multi-step problems

Generalizing from examples, extending examples, and generating counter examples.

- Makes and extends mathematical connections to non-routine problems
- Produce own examples and counter-examples
- Can follow, write and interpret multi-step problems
- Evaluates appropriateness of answers to complex problems
- Multi-step (in a variety of ways) designs model to solve problems
- Generalize (algebraic model)
- Visualize beyond non-scale drawings
- Non-routine counter example